

PUB-NO: WO009300029A1  
DOCUMENT-IDENTIFIER: WO 9300029 A1  
TITLE: STATIC CHAIR  
PUBN-DATE: January 7, 1993

INVENTOR-INFORMATION:

NAME

COUNTRY

OWEN, EARL RONALD

AU

ASSIGNEE-INFORMATION:

NAME

COUNTRY

OWEN EARL RONALD

AU

APPL-NO: AU09200311

APPL-DATE: June 24, 1992

PRIORITY-DATA: AUPK686691A ( June 24, 1991)

INT-CL (IPC): A47C001/12, A47C001/121 , A47C007/18  
, A47C007/20

EUR-CL (EPC): A47C007/02 ; A47C007/18, A47C031/12

US-CL-CURRENT: 297/452.27

## ABSTRACT:

A static chair designed to provide comfort to the user in both upright and slumped positions by the provision of different shaped layers of foam plastics material of different densities in various regions of the cushion and backrest. The cushion has a base layer of foam in which are inset two zones of lower density foam (8 and 9) located in regions beneath the buttocks of a typical user in the upright and slumped positions respectively. The backrest is also contoured to provide lumbar support in both upright and slumped positions by the provision of foam material layers of different densities. The cushion (1) and backrest (2) are designed so that they may be substituted for materials in existing static chairs typically used in a theatre situation without requiring total chair replacement.



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>5</sup> :A47C 1/12, 1/121, 7/18  
A47C 7/20

A1

(11) International Publication Number:

WO 93/00029

(43) International Publication Date:

7 January 1993 (07.01.93)

(21) International Application Number: PCT/AU92/00311

(22) International Filing Date: 24 June 1992 (24.06.92)

(30) Priority data:

PK 6866

24 June 1991 (24.06.91)

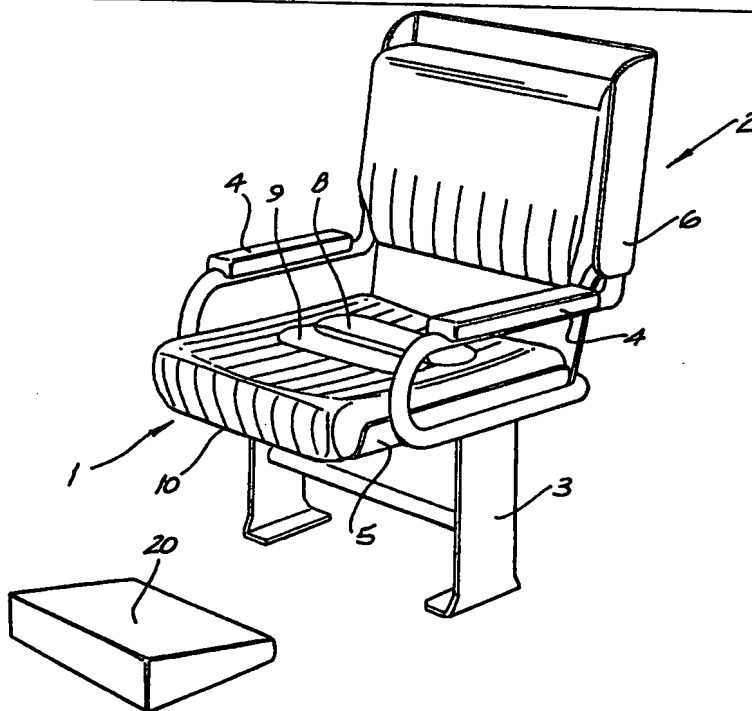
AU

(71)(72) Applicant and Inventor: OWEN, Earl, Ronald [AU/  
AU]; Microsurgery Centre, 1 Esther Street, Surry Hills,  
NSW 2010 (AU).(74) Agent: FORSTER, John, D.; Griffith Hack & Co., GPO  
Box 4164, Sydney, NSW 2001 (AU).(81) Designated States: AT, AU, BB, BG, BR, CA, CH, DE,  
DK, ES, FI, GB, HU, JP, KP, KR, LK, LU, MG, MW,  
NL, NO, PL, RO, RU, SD, SE, US, European patent  
(AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LU, MC,  
NL, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA,  
GN, ML, MR, SN, TD, TG).

Published

*With international search report.*

(54) Title: STATIC CHAIR



(57) Abstract

A static chair designed to provide comfort to the user in both upright and slumped positions by the provision of different shaped layers of foam plastics material of different densities in various regions of the cushion and backrest. The cushion has a base layer of foam in which are inset two zones of lower density foam (8 and 9) located in regions beneath the buttocks of a typical user in the upright and slumped positions respectively. The backrest is also contoured to provide lumbar support in both upright and slumped positions by the provision of foam material layers of different densities. The cushion (1) and backrest (2) are designed so that they may be substituted for materials in existing static chairs typically used in a theatre situation without requiring total chair replacement.

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	FI	Finland	ML	Mali
AU	Australia	FR	France	MN	Mongolia
BB	Barbados	GA	Gabon	MR	Mauritania
BE	Belgium	GB	United Kingdom	MW	Malawi
BF	Burkina Faso	GN	Guinea	NL	Netherlands
BG	Bulgaria	GR	Greece	NO	Norway
BJ	Benin	HU	Hungary	PL	Poland
BR	Brazil	IE	Ireland	RO	Romania
CA	Canada	IT	Italy	RU	Russian Federation
CF	Central African Republic	JP	Japan	SD	Sudan
CG	Congo	KP	Democratic People's Republic of Korea	SE	Sweden
CH	Switzerland	KR	Republic of Korea	SN	Senegal
CI	Côte d'Ivoire	LI	Liechtenstein	SU	Soviet Union
CM	Cameroon	LK	Sri Lanka	TD	Chad
CS	Czechoslovakia	LU	Luxembourg	TG	Togo
DE	Germany	MC	Monaco	US	United States of America
DK	Denmark	MG	Madagascar		
ES	Spain				

- 1 -

# "STATIC CHAIR"

## TECHNICAL FIELD

This invention relates to a static chair and has been devised particularly though not solely for a mass seating application.

## BACKGROUND ART

In many mass seating situations such as concert halls, theatres, or opera chambers, individual seats on fixed bases are provided for the patrons. Such seats commonly have a shell supporting the seat and backrest portions and the seat portion may be designed to tip up to allow access along narrow rows.

The cushion and backrest on seats of this type are typically designed to suit an average person seated in an upright position. During long performances, it is common for patrons to become uncomfortable and/or restless and to slump in their seats into a position where the chair no longer provides the desirable anatomic support.

It is possible to overcome this problem using so-called dynamic seats which have adjustable seat and backrest portions but it is generally impossible or impractical to incorporate any form of dynamic seating in a fixed mass seating situation such as a concert chamber or theatre.

It is therefore an object of the present invention to provide a static seat which will give some of the advantages of a dynamic seat, and comfortably support users of different sizes in either upright or slumped positions.

## DISCLOSURE OF THE INVENTION

The present invention therefore provides a seat having a cushion formed from resilient foam material comprising a base layer of foam of predetermined density and at least two zones of relatively low density foam inset into the upper face of the base layer, the first said zone being positioned so as to be located beneath the buttocks of a typical user seated in an upright position and the second said zone being positioned so as

- 2 -

to be located beneath the buttocks of a typical user seated in a slumped position.

Preferably said zones are substantially oval in plan view having longer and shorter axes, the longer axis  
5 being orientated transversely across the cushion.

Preferably said first and second zones overlap one another.

Preferably the front edge of the cushion is formed from a region of foam having a lower density relative to the  
10 base layer foam.

Preferably the upper face of the front edge region is curved outwardly and downwardly from the upper face of the base layer.

Preferably the cushion further comprises at least one  
15 foundation layer of foam beneath the base layer, the foundation layer foam having a higher density than the base layer foam.

Preferably the seat incorporates a backrest formed from resilient foam material comprising a lumbar support  
20 region positioned so as to be located across the lumbar region of a typical user seated in an upright position, and a lower region located beneath the lumbar region, the lower region foam having a lower density than the lumbar support region foam.

Preferably the lumbar support region tapers in  
25 thickness upwardly from the lumbar region of a typical user and is overlaid by an upper back support region which tapers in thickness downwardly from the top of the backrest, the upper back support region foam having a  
30 lower density than the lumbar support region foam.

Preferably the forward face of the backrest is generally concave in horizontal section.

#### BRIEF DESCRIPTION OF DRAWINGS

Notwithstanding any other forms that may fall within  
35 its scope, one preferred form of the invention will now be described by way of example only with reference to the accompanying drawings, in which:-

Fig. 1 is a diagrammatic perspective view of a static

theatre seat according to the invention;

Fig. 2 is a perspective partial view of the cushion of the seat shown in Fig. 1;

Fig. 2A is a transverse cross-section through the foundation layer of the cushion in the region under the soft zones;

Fig. 3 is a vertical section through the cushion shown in Fig. 2, showing a long legged user seated on the cushion;

Fig. 4 is a similar view to Fig. 3 showing a short legged user seated on the cushion;

Fig. 5 is a diagrammatic perspective view of the backrest portion of the seat shown in Fig. 1;

Fig. 6 is a vertical cross-section through the backrest portion shown in Fig. 5;

Fig. 7 is a vertical section through a foot rest designed for use with the seat shown in Fig. 1; and

Fig. 8 is a diagrammatic vertical section showing the use of the foot rest as a bolster cushion.

#### 20 MODES FOR CARRYING OUT THE INVENTION

In the preferred form of the invention a static seat having a cushion portion (1) and a backrest portion (2) is designed for use in a fixed theatre situation and may typically be mounted on a pedestal base (3). The seat is also typically provided with arm rests (4) and the seat portion (1) may be designed to tip up for easy access along narrow rows.

The cushion portion (1) may be supported on a frame or shell (5) and similarly the backrest portion (2) may be supported by a frame or a shell (6).

The cushion portion is formed from resilient foam material (typically foamed plastics material) and comprises a base layer (7) of foam of predetermined density. Two zones (8) and (9) of lower density foam are provided inset into the upper face of the base layer (7) and positioned so that the first zone (8) is positioned beneath the buttocks of a typical user seated in an upright position, and the second zone (9) is positioned

- 4 -

beneath the buttocks of a typical user seated in a slumped position.

The zones (8) and (9) may be any desirable shape in plan view but are typically oval in plan view with the longer axis of the oval orientated transversely across the cushion as may be seen in Figs. 1 and 2.

As can also be clearly seen from the drawings, the first and second zones overlap one another in this particular example.

The front edge (10) of the cushion is formed from a region of foam (11) which may have a lower density relative to the density of the foam in the base layer (7). Alternatively the base layer (7) may simply extend into the front edge region (11). The upper face (12) of the front edge region is curved outwardly and downwardly from the upper face (13) of the base layer.

In order to prevent "bottoming" of the seat cushion under the weight of a heavy user, a foundation layer (14) may also be provided beneath the base layer. The foundation layer foam has a higher density than the foam in the base layer (7). The foundation layer (14) is preferably shaped in front-to-back profile so as to have a thicker portion (24) in the area beneath the thighs of a typical user, and a relatively thinner area (25) in the region beneath the buttocks of a typical user. This shape is clearly seen in Fig. 2.

It is also desirable to shape the foundation foam (14) in transverse section as shown in Fig. 2A so that the foundation layer has a concave upper surface (26) in transverse section beneath the zones (8) and (9) of relatively low density foam.

In some seating situations it may also be desirable to also provide an intermediate layer of foam (23) interposed between the foundation layer (25) and the base layer (7) and having a density which is intermediate the density of the foundation layer (14) and the base layer (7). The intermediate layer is shaped to the profile shown in Fig. 2 having a relatively thick portion under



the thigh region of a typical user and a relatively thin portion under the zones (8) and (9).

The backrest (2) is also formed from resilient foam material comprising a lumbar support region (15) positioned so as to be located across the lumbar region of a typical user seated in an upright position, and a lower region (16) located beneath the lumbar region, the foam of the lower region (16) having a lower density than the foam of the lumbar support region (15).

The upper portion of the lumbar support region (15) tapers in thickness upwardly from the lumbar region as shown at (17) and is overlaid by an upper back support region (18) which tapers in thickness downwardly from the top of the backrest (19), the upper back support region (18) being formed of foam having a lower density than the foam of the lumbar support region (15).

The backrest is generally concave in horizontal section as can be seen in Fig. 5.

When a user sits in the seat in a upright position, the buttocks of the user are located in the low density zone (8) providing a comfortable cushion beneath the buttocks. The lumbar support region (15) supports the lumbar forward curve of the spine and the lower region (16), being relatively soft, allows the backside of the user to tuck in under the lumbar support region when sitting up. Although the upper back support region (18) is of relatively soft foam, there is little weight on this region when sitting in an upright position and the backrest therefore feels relatively firm to the user.

When the user reclines into a slumped position, the buttocks are comfortably located within the soft zone (9), the backside is supported by the lower region (16), and the relatively soft foam in the upper back support region (18) compresses giving comfortable support in the slumped position.

In this manner, the static chair gives comfortable support to the user in both upright and slumped positions enabling the user to adjust his position for comfort

- 6 -

while being adequately supported at all times.

The chair according to the invention is also comfortable for both long legged and short legged users due to the nature of the front edge portion (11). The  
5 soft foam of the front edge portion gives the impression of a long seat for long legged users as shown in Fig. 3, but collapses onto the harder density foam of the base layer (7) with shorter legged people as shown in Fig. 4.

The high density foam (14) in the foundation layer  
10 prevents bottoming of the seat even with heavy users.

As an optional feature, the seat may also be provided with a wedge-shaped foot rest (20) formed from a relatively high density base layer (21) and a lower density covering layer (22). The foot rest (which may be  
15 tucked away under the seat when not in use) not only enhances the comfort of short legged users but also may be placed on top of the seat cushion as shown in Fig. 8 to allow small children to sit up and see the stage.

The static seat according to the invention not only has  
20 the advantage that it gives the comfort of a dynamic seat and allows the user to be comfortably supported in both upright and slumped positions, but furthermore due to the unitary nature of both the cushion (1) and the backrest (2), these portions may readily be substituted for  
25 conventional cushions and backrests in existing theatre seats. The invention therefore enables the use of existing theatre seat frameworks and shells to be readily converted into the comfortable static seat configuration.

## CLAIMS:

1. A seat having a cushion formed from resilient foam material comprising a base layer of foam of predetermined density and at least two zones of relatively low density foam inset into the upper face of the base layer, the first said zone being positioned so as to be located beneath the buttocks of a typical user seated in an upright position and the second said zone being positioned so as to be located beneath the buttocks of a typical user seated in a slumped position.
2. A seat as claimed in claim 1 wherein said zones are substantially oval in plan view having longer and shorter axes, the longer axis being orientated transversely across the cushion.
3. A seat as claimed in either claim 1 or claim 2 wherein said first and second zones overlap one another.
4. A seat as claimed in any one of the preceding claims wherein the front edge of the cushion is formed from a region of foam having a lower density relative to the base layer foam.
5. A seat as claimed in any one of the preceding claims wherein the cushion further comprises at least one foundation layer of foam beneath the base layer, the foundation layer foam having a higher density than the base layer foam.
6. A seat as claimed in claim 5 wherein the foundation layer is thicker beneath the thigh region of a typical user than beneath the buttock region of the user.
7. A seat as claimed in either claim 5 or claim 6 wherein the foundation layer has a concave upper surface in transverse section beneath the said zones of relatively low density foam.
8. A seat as claimed in any one of the preceding claims wherein the seat incorporates a backrest formed from resilient foam material comprising a lumbar support region positioned so as to be located across the lumbar region of a typical user seated in an upright position, and a lower region located beneath the lumbar region, the

- 8 -

lower region foam having a lower density than the lumbar support region foam.

9. A seat as claimed in claim 8 wherein the lumbar support region tapers in thickness upwardly from the lumbar region of a typical user and is overlaid by an upper back support region which tapers in thickness downwardly from the top of the backrest, the upper back support region foam having a lower density than the lumbar support region foam.

10. A seat as claimed in either claim 8 or claim 9 wherein the forward face of the backrest is generally concave in horizontal section.

1/3

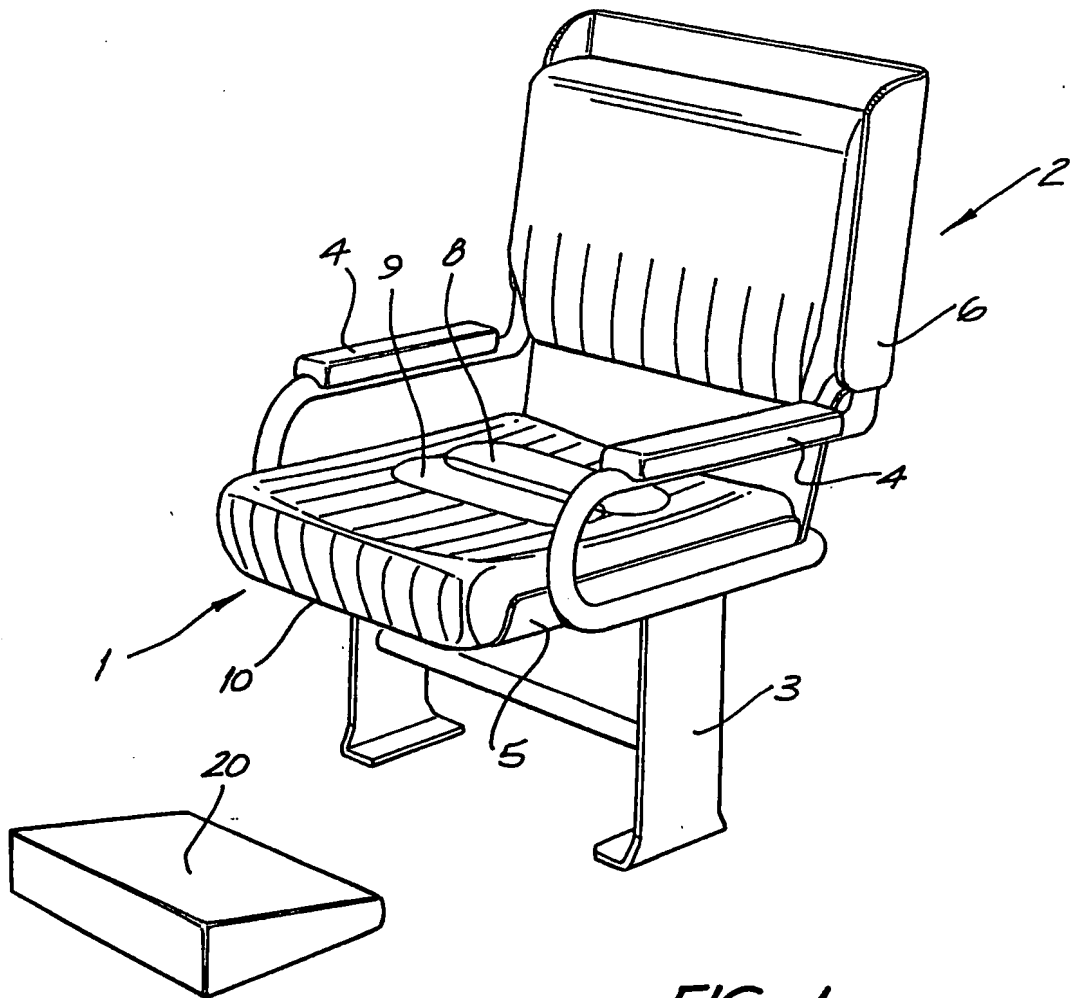


FIG. 1

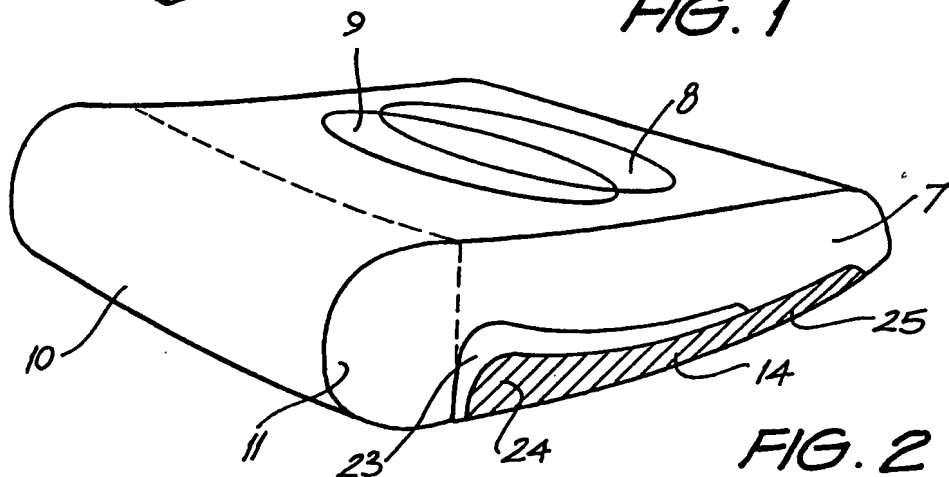


FIG. 2

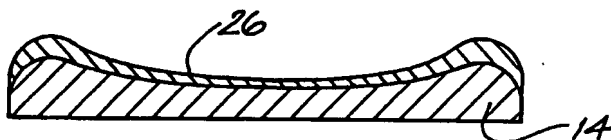
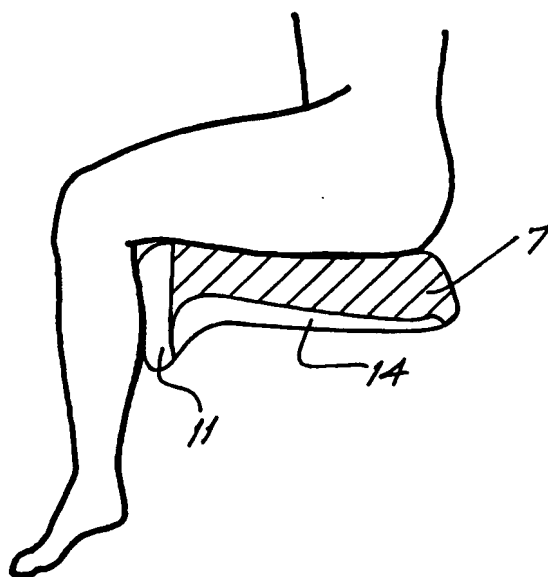
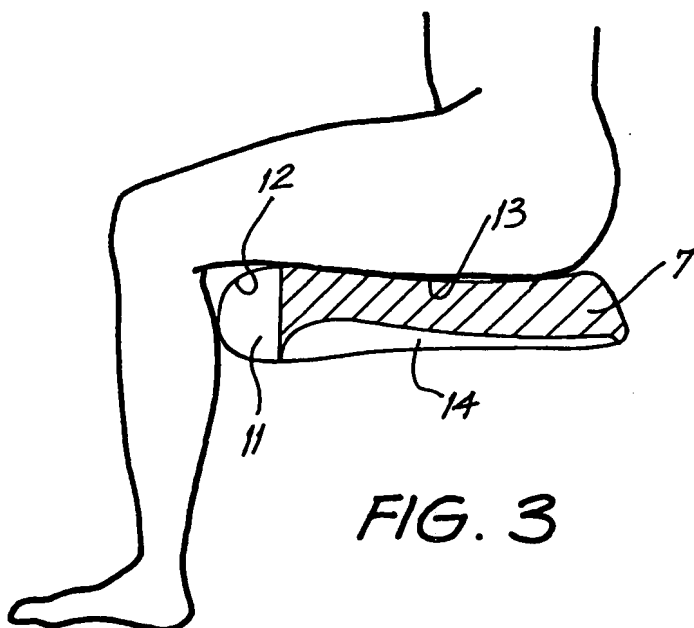


FIG. 2A

2/3



3/3

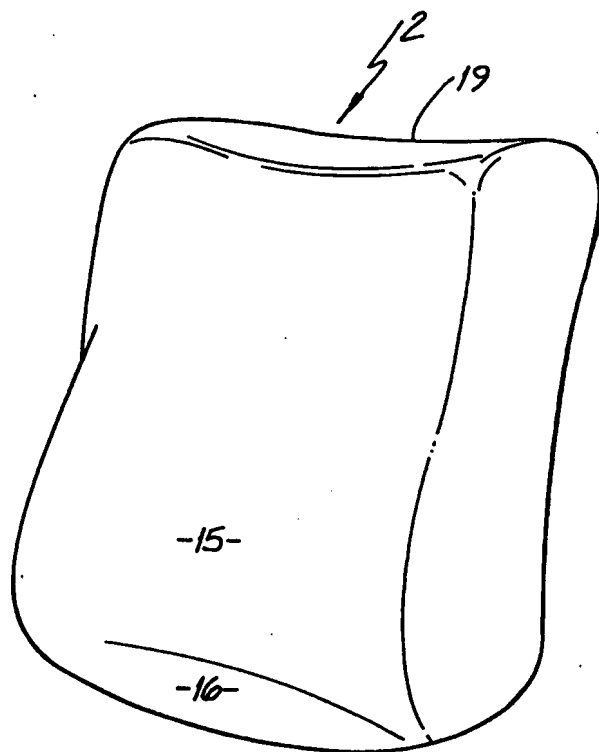


FIG. 5

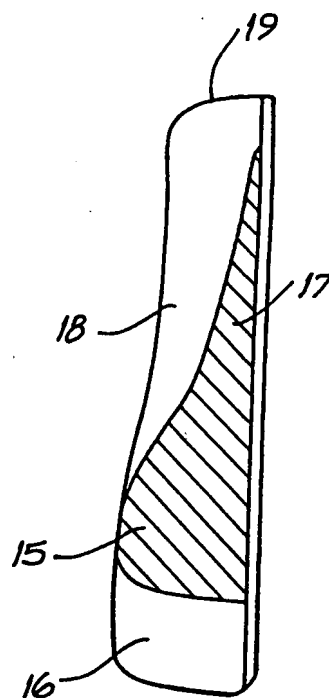


FIG. 6

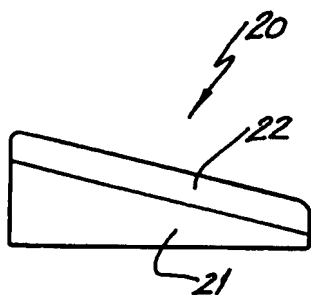


FIG. 7

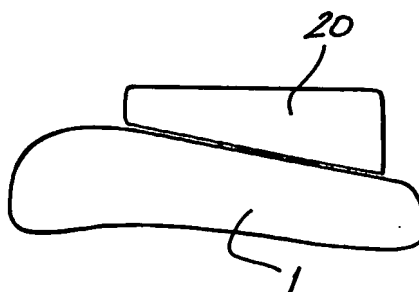
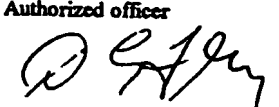


FIG. 8

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU92/00311

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> Int. Cl. <sup>5</sup> A47C 1/12, 1/121, 7/18, 7/20  According to International Patent Classification (IPC) or to both national classification and IPC				
<b>B. FIELDS SEARCHED</b>  Minimum documentation searched (classification system followed by classification symbols) IPC A47C 1/12, 1/121, 7/18, 7/20  Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched AU : IPC AS ABOVE  Electronic data base consulted during the international search (name of data base, and where practicable, search terms used)				
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>				
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.		
A A	US,A, 3,751,111 (TAYLOR et al.) 7 August 1973 (07.08.73) column 1 lines 44-67, column 2 lines 1-6 Entire document	1 4-10		
A	US,A, 3,503,649 (JOHNSON) 31 March 1970 (31.03.70) Entire document	1-10		
<div style="display: flex; justify-content: space-between;"> <div> <input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C.         </div> <div> <input checked="" type="checkbox"/> See patent family annex.         </div> </div>				
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>* Special categories of cited documents :</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"I" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"()" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </td> <td style="width: 50%; vertical-align: top;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&amp;" document member of the same patent family</p> </td> </tr> </table>			<p>* Special categories of cited documents :</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"I" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"()" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&amp;" document member of the same patent family</p>
<p>* Special categories of cited documents :</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"I" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"()" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&amp;" document member of the same patent family</p>			
Date of the actual completion of the international search 25 September 1992 (25.09.92)		Date of mailing of the international search report 7 Oct 1992 (07.10.92)		
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200 WODEN ACT 2606 AUSTRALIA  Facsimile No. 06 2853929		Authorized officer  D.G. FRY  Telephone No. (06) 2832130		



**INTERNATIONAL SEARCH REPORT**

International application No.

**PCT/AU92/00311**

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate of the relevant passages	Relevant to Claim No.
P.A.	Patents Abstracts of Japan, M1181, Page 14, JP,A, 3-193540 (DELTA KOGYO K.K.) 23 August 1991 (23.08.91) Entire document	1-10
A	US,A, 3,642,323 (TAYLOR) 15 February 1972 (15.02.72) Entire document	1

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/AU

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member		
DE	3536644	EP	215858	WO 8605091
EP	286446	JP	63220215	
END OF ANNEX				